



An Investigation of Seismicity in the Marmara Region with Probabilistic Approaches

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In this study, seismicity of the Marmara Region has been investigated and the results have been related with the active tectonic regime of the region. Therefore, the Marmara region has been divided into 6 sub-regions having regard to the all possible characteristics such as seismotectonic properties, type of faulting and seismicity of the region and the data belonging to both the historical ($I_0 \geq 9.0$ corresponding to $M_S \geq 7.0$ before 1900) and instrumental (until 2014, $M_S \geq 4.0$) period has been used. Gutenberg-Richter (GR) relationship for each sub-region has been computed. The highest and the lowest b-values determined by the Linear Least Square (LLS) method are found for sub-region 4 (Saros Gulf, 0.74) and sub-region 1 (Duzce, 0.56), respectively. Likewise, the calculated lowest and highest b-values with Maximum Likelihood (ML) are 0.55 for sub-region 1 and 0.68 for sub-region 4, respectively. Also, b-value for all region (108 years and $M_S \geq 4.0$) are estimated as 0.71 with LLS and 0.65 with ML. The highest earthquake occurrence probability of $M_S \geq 7.0$ in the next 100 years is 74.4% for sub-region 1. Recurrence time for the earthquake with the same magnitude is determined as 73 years in this sub-region. The sub-region 1 with low b-value (0.56 for LLS and 0.55 for ML) may be interpreted as possible asperities reflecting variations in frictional properties along the fault, which may control the recurrence of the next large event.